# INDEX


AMASSIAN, V. E. See TOWE, A. L., 292
Apical dendrites, significance of, in auditory area, 231
ARDUINI, A. See BROOKHART, J. M., 499
Auditory area, cortical evoked responses in, 231
Auditory cortex, 17, 231, 569
—— ——, binaural masking at, 17
AUSTIN, G. M. See MCCOUCH, G. P., 205, 217

BENDER, M. B. See KRIEGER, H. P., 224
Betz cell activity, 368, 380
Binaural effects in lateral lemniscus, 17
BISHOP, P. O., FIELD, G., HENNESSY, B. L., and SMITH, J. R. Action of d-lysergic acid diethylamide on lateral geniculate synapses, 529
BRACKETT, C. E., JR. See BROWN, M. L., 279
Brain, electrical identification in, 138
—— stem convulsion, 430
—— —— lesions, effect of, on perception of noxious stimulation, 353
—— —— stimulation and eye and body movements, 171
BRANCH, C. L. and MARTIN, A. R. Inhibition of Betz cell activity by thalamic and cortical stimulation, 380
BRANCH, C. L. See MARTIN, A. R., 368
BRITTIN, G. M. See CARPENTER, M. B., 400
BROOKHART, J. M., ARDUINI, A., MANCIA, M., and MORUZZI, G. Thalamocortical relations as revealed by induced slow potential changes, 499
BROOKS, C. MCC. See SUDA, I., 113
BROWN, M. L. and BRACKETT, C. E., JR. Subcortical threshold voltages as a function of sine wave frequencies, 279

CARPENTER, M. B. and BRITTIN, G. M. Subthalamic hyperkinesia in rhesus monkey. Effects of secondary lesions in red nucleus and brachium conjunctivum, 400
Central nervous system response to 'C' fibers, 345
Cerebral cortex, cutaneous tactile sensibility in, 481
—— ——, potentials evoked by photic stimuli, 437
—— ——, stimulation of, 589
Cerebro-cerebellar relations, 1
Cortical response from afferents, 611
CHIMION, D. See KREINDLER, A., 430
COHEN, L. A. Analysis of position sense in human shoulder, 563
COHEN, L. A. Contributions of tactile, musculo-tendinous and joint mechanisms to position sense in human shoulder, 550
COLLINS, W. F. and RANDT, C. T. Evoked central nervous system activity relating to peripheral unmyelinated or 'C' fibers in cat, 345
Color vision, 70, 247
Consciousness and eye movements, 224
Convulsions induced by brain stem stimulation, 430
Corpus striatum and spinal cord, 391
Cortical response and dendrites, 231
—— ——, depression of, 159
—— units and digit stimulation, 292
COXE, W. S. See HIRSCH, J. F., 481
Crossed inhibition of sacral motoneurons, 319
—— reflexes from muscle, 101
CURTIS, D. R., KRNJEVIĆ, K., and MILEDI, R. Crossed inhibition of sacral motoneurones, 319
Cutaneous tactile sensibility in cerebral cortex, 481

DEANE, H. W., ENROTH-CUGELL, C., GONGAWARE, M. S., NEYLAND, M., and FORBES, A. Electroretinogram of freshwater turtle: form and spectral sensitivity, 45
DEANE, H. W. See FORBES, A., 247
DELGADO, J. M. R. See SCHOOLMAN, A., 1
Digit stimulation, effect of, on cortical units, 292
Dorsal root reflex, postsynaptic source of, 217
DOTY, R. W. Potentials evoked in cat cerebral cortex by diffuse and by punctiform photic stimuli, 437

Ear, 17, 231, 569
EDWARDS, C. See KUFFLER, S. W., 589
Efferent spindle excitation, 465
Electrical identification in brain, 138
Electrophysiology of olfactory bulb, 183
Electroretinogram, form and spectral sensitivity of, 45
ENROTH-CUGELL, C. See DEANE, H. W., 45

von Euler, C. and Ricci, G. F. Cortical evoked responses in auditory area and significance of apical dendrites, 231
Evoked slow potentials, 499
Eye, 45, 63, 70, 171, 224, 247, 419, 437
Eyzaguirre, C. Modulation of sensory discharges by efferent spindle excitation, 465

Faulkner, R. F. and Hyde, J. E. Coordinated eye and body movements evoked by brainstem stimulation in decerebrated cats, 171
Field, G. See Bishop, P. O., 529
Forbes, A., Deane, H. W., Neyland, M., and Gongaware, M. S. Electroretinogram of fresh-water turtle: quantitative responses to color shift, 247
Forbes, A. See Deane, H. W., 45
Frank, G. B. Effect of veratrine on muscle fibre membrane and on negative afterpotential, 263

Galvanic skin reflex, 327
Gamma aminobutyric acid action, 589
Geniculate synapses, LSD action on, 529
Gongaware, M. S. See Deane, H. W., 45
——. See Forbes, A., 247
Grossman, R. G. Effects of stimulation of non-specific thalamic system on locomotor movements in cat, 85

Handa, H. See Levine, R. B., 138
Hashimura, S. and Wright, E. B. Effect of ionic environment on excitability and electrical properties of frog single nerve fiber, 24
Hennessy, B. L. See Bishop, P. O., 529
Hirsch, J. F. and Coxe, W. S. Representation of cutaneous tactile sensibility in cerebral cortex of *Cebus*, 481
Hyde, J. E. See Faulkner, R. F., 171
Hyperkinesia, subthalamic, 400

Inhibition of Betz cell activity, 368, 380
Ionic environment, effect of, on single nerve fiber, 24

Johnson, A. R. See Wall, P. D., 148

Katsuki, Y., Sumi, T., Uchiyama, U., and Watanabe, T. Electric responses of auditory neurons in cat to sound stimulation, 569
Koizumi, K. See Suda, I., 113
Kreindler, A., Zuckermann, E., Steriade, M., and Chimion, D. Electroclinical features of convulsions induced by stimulation of brain stem, 430
Krieger, H. P., Wagman, I. H., and Bender, M. B. Changes in state of consciousness and patterns of eye movements, 224
Krnjević, K. See Curtis, D. R., 319
Kuffler, S. W. and Edwards, C. Mechanism of gamma aminobutyric acid (GABA) action and its relation to synaptic inhibition, 589

Lateral inhibition in eye, 419
—— lemniscus, binaural effects in, 17
Lennox, M. A. The on responses to colored flash in single optic tract fibers of cat: correlation with conduction velocity, 70
——. Single fiber responses to electrical stimulation in cat's optic tract, 62
Levine, R. B., Retzlaff, E., Handa, H., and Till, K. Electrical identification of certain nuclei and fiber tracts in brain of cat, 138
Liu, C. N. See McCouch, G. P., 205
——, C. Y. See McCouch, G. P., 205
Livingston, W. K. See Melzack, R., 353
Locomotor movement, thalamic effect of stimulation on, 85
LSD action on geniculate synapses, 529
Luco, J. V. See Vera, C. L., 334

Mancia, M. See Brookhart, J. M., 499
Martin, A. R. and Branch, C. L. Spontaneous activity of Betz cells in cats with midbrain lesions, 368
McCouch, G. P. and Austin, G. M. Postsynaptic source of dorsal root reflex, 217
McCouch, G. P., Austin, G. M., Liu, C. N., and Liu, C. Y. Sprouting as a cause of spasticity, 205
Martin, A. R. See Branch, C. L., 380
Mechanism in position sense, 550, 563
Melzack, R., Stotler, W. A., and Livingston, W. K. Effects of discrete brain stem lesions in cats on perception of noxious stimulation, 353
Midbrain lesions and Betz cell activity, 368
Migliaro, E. F. See Segundo, J. P., 391
Miledi, R. See Curtis, D. R., 319
Monosynaptic reflex, post-tetanic potentiation of, 148
Moruzzi, G. See Brookhart, J. M., 499
Motor behavior and brain stem stimulation, 171, 224
—— responses from cerebral motor area, 1
Mozell, M. M. Electrophysiology of olfactory bulb, 183
Muscle, crossed reflexes from, 101
—— fiber membrane, effect of veratrine on, 263

Myelinated nerve fiber, voltage clamp in, 124

NAKAHAMA, H. Contralateral and ipsilateral cortical responses from somatic afferent nerves, 611
Neocerebellar stimulation, 1
NEYLAND, M. See DEANE, H. W., 45
——. See FORBES, A., 247
Noxious stimulation, perception of, 353

OCHS, S. Effects of spreading depression on direct cortical response studied with an island technique, 159
Olfactory bulb, electrophysiology of, 183
Optic tract response, 63, 70

Perception of noxious stimulation, 353
PERL, E. R. Crossed reflex effects evoked by activity in myelinated afferent fibers of muscle, 101
Position sense in shoulder, 550, 563
Post-tetanic potentiation, 148

RANDT, C. T. See COLLINS, W. F., 345
Response of single auditory neurons, 569
Reticular formation action on neurons, 113
—— system and galvanic skin reflex, 327
Retina, 247, 437
RETZLAFF, E. See LEVINE, R. B., 138
RICCI, G. F. See VON EULER, C., 231
ROIG, J. A. See SEGUNDO, J. P., 391
ROSENZWEIG, M. R. and SUTTON, D. Binaural interaction in lateral lemniscus of cat, 17

Sacral inhibitions, 319
SCHOOLMAN, A. and DELGADO, J. M. R. Cerebro-cerebellar relations in the awake cat, 1
SEGUNDO, J. P., MIGLIARO, E. F., and ROIG, J. A. Effect of striatal and claustral stimulation upon spinal reflex and strychnine activity, 391
Sensory discharges and efferent spindle excitation, 465
Shoulder, position sense in, 550, 563
Single fiber response to optic tract stimulation, 63, 70
—— nerve fiber, ion effects on, 24
SMITH, J. R. See BISHOP, P. O., 529
Somatic afferent nerves, cortical response from, 611
Somatosensory cortex, unit response in, 292
Spasticity and sprouting, 205
Spectral sensitivity, 45
Spinal cord and corpus striatum, 391
—— dorsal roots, synaptic transmission in, 334
—— reflex pathway, reticular formation influences on, 113
Spreading depression and cortical response, 159
Sprouting and spasticity, 205
STERIADE, M. See KREINDLER, A., 430
Stimulation of olfactory bulb, 183
STOTLER, W. A. See MELZACK, R., 353
Subcortical threshold voltages, 279
Subthalamic hyperkinesia, 400
—— stimulation and locomotor movement, 85
SUDA, I., KOIZUMI, K., and BROOKS, C. McC. Reticular formation influences on neurons of spinal reflex pathway, 113
SUMI, T. See KATSUKI, Y., 569
SUTTON, D. See ROSENZWEIG, M. R., 17
Synaptic inhibition and GABA, 589
—— transmission in spinal dorsal roots, 334

Tactile cortex, 481
Thalamocortical relations, 499
TILL, K. See LEVINE, R. B., 138
TOMITA, T. Mechanism of lateral inhibition in eye of *Limulus*, 419
TOWE, A. L. and AMASSIAN, V. E. Patterns of activity in single cortical units following stimulation of the digits in monkeys, 292

UCHIYAMA, U. See KATSUKI, Y., 569
Unit response in somatosensory cortex, 292
Unmyelinated fiber stimulation, 345

VERA, C. L. and LUCO, J. V. Synaptic transmission in spinal cord during Wallerian degeneration of dorsal root fibers, 334
Veratrine negative after-potential, 263
Voltage clamp in myelinated nerve fiber, 124
—— frequency thresholds, 279

WAGMAN, I. H. See KRIEGER, H. P., 224
WALL, P. D. and JOHNSON, A. R. Changes associated with post-tetanic potentiation of a monosynaptic reflex, 148
Wallerian degeneration of dorsal root fibers, 334
WANG, G. H. Strychninization of bulbar ventromedial reticular formation and galvanic skin reflex in thalamic cats, 327
WATANABE, T. See KATSUKI, Y., 569
WRIGHT, E. B. See HASHIMURA, S., 24

ZUCKERMANN, E. See KREINDLER, A., 430

BOOK REVIEWS

BASSETT, D. L. *A frontal section anatomy of the head and neck*, by O. F. Kampmeier *et al.*, 316

BONNYCASTLE, D. D. *Functions of autonomic transmitters*, by J. H. Burn, 94

CHRISTENSEN, K. *Die periphere Innervation*, 11th ed., by E. Villiger, 313

DENNY-BROWN, D. *Sherrington, physiologist, philosopher and poet*, by Cohen of Birkenhead, 634

FRUTON, J. S. *Ultrastructure and cellular chemistry of neural tissue*, ed. by H. Waelsch, 94

GIARMAN, N. J. *Chemotherapy and the central nervous system*, by H. McIlwain, 416

GRANIT, R. *The vertebrate visual system*, by S. Polyak, 314

GROB, D. *An atlas of muscle pathology in neuromuscular diseases*, by J. Greenfield *et al.*, 201

LINDSLEY, D. B. *Autonomic imbalance and the hypothalamus*, by E. Gellhorn, 633

MARSHALL, W. H. *Physiology of the nervous system*, by E. G. Walsh, 414

MASSOPUST, L. C., JR. *Morphologie und Physiologie des Nervensystems*, by P. Glees, 634

NAUTA, W. J. H. *Functional neuro-anatomy*, 3rd ed., by A. R. Buchanan, 200

SCHEIBEL, M. E. and A. B. *The reticular formation of the brain stem*, by A. Brodal, 95

WALKER, A. E. *Atlas d'anatomie stéréotaxique*, by J. Talairach *et al.*, 414

YAKOVLEV, P. I. *L'instinct dans le comportement des animaux et de l'homme*, by Fondation Singer-Polignac, 198

JOURNAL OF NEUROPHYSIOLOGY

# JOURNAL OF NEUROPHYSIOLOGY

[*J. Neurophysiol.*]

VOLUME TWENTY ONE

1958

CHARLES C THOMAS
SPRINGFIELD, ILLINOIS, U.S.A.

*EDITORIAL BOARD*

JOHN F. FULTON

STEPHEN W. KUFFLER — JAMES L. O'LEARY

PAUL D. MACLEAN — THEODORE C. RUCH

H. W. MAGOUN — DONAL SHEEHAN

CLINTON N. WOOLSEY

*Assistant Editor,* MARY P. WHEELER

*ADVISORY BOARD*

LORD ADRIAN (Cambridge)
PERCIVAL BAILEY (Chicago)
PHILIP BARD (Baltimore)
G. H. BISHOP (St. Louis)
F. BREMER (Brussels)
DETLEV W. BRONK (New York)
FRITZ BUCHTHAL (Copenhagen)
HSIANG-TUNG CHANG (New York)
STANLEY COBB (Boston)
HALLOWELL DAVIS (St. Louis)
U. EBBECKE (Bonn)
J. C. ECCLES (Canberra)
JOSEPH ERLANGER (St. Louis)
WALLACE O. FENN (Rochester)
A. FESSARD (Paris)
ALEXANDER FORBES (Boston)
H. S. GASSER (New York)
RAGNAR GRANIT (Stockholm)
W. R. HESS (Zürich)
MARION HINES (Atlanta)
DAVENPORT HOOKER (New Haven)
YASUJI KATSUKI (Tokyo)
ARISTIDES A. P. LEÃO (Rio de Janeiro)
GIUSEPPE MORUZZI (Pisa)
WILDER PENFIELD (Montreal)
H. PIÉRON (Paris)

# TABLE OF CONTENTS

## NO. 1, JANUARY 1958


Cerebro-cerebellar relations in the awake cat. ARNOLD SCHOOLMAN AND JOSÉ M. R. DELGADO ..... 1

Binaural interaction in lateral lemniscus of cat. MARK R. ROSENZWEIG AND DWIGHT SUTTON ..... 17

Effect of ionic environment on excitability and electrical properties of frog single nerve fiber. SABURO HASHIMURA AND ERNEST B. WRIGHT ..... 24

Electroretinogram of fresh-water turtle: form and spectral sensitivity. HELEN WENDLER DEANE, CHRISTINA ENROTH-CUGELL, MARY SUSAN GONGAWARE, MARJORIE NEYLAND AND ALEXANDER FORBES ..... 45

Single fiber responses to electrical stimulation in cat's optic tract. MARGARET A. LENNOX ..... 62

The on responses to colored flash in single optic tract fibers of cat: correlation with conduction velocity. MARGARET A. LENNOX ..... 70

Effects of stimulation of non-specific thalamic system on locomotor movements in cat. ROBERT G. GROSSMAN ..... 85

Reviews ..... 94

Announcement ..... 97

Manuscripts accepted for publication ..... 98


## NO. 2, MARCH 1958


Crossed reflex effects evoked by activity in myelinated afferent fibers of muscle. EDWARD R. PERL ..... 101

Reticular formation influences on neurons of spinal reflex pathway. ISAMU SUDA, KIYOMI KOIZUMI, AND CHANDLER MCC. BROOKS ..... 113

Current-voltage relations of single nodes of Ranvier as examined by voltage-clamp technique. I. TASAKI AND A. F. BAK ..... 124

Electrical identification of certain nuclei and fiber tracts in brain of cat. RAPHAEL B. LEVINE, ERNEST RETZLAFF, HAJIME HANDA, AND KENNETH TILL ..... 138

Changes associated with post-tetanic potentiation of a monosynaptic reflex. PATRICK D. WALL AND AVERY R. JOHNSON ..... 148

Effects of spreading depression on direct cortical response studied with an island technique. SIDNEY OCHS ..... 159

Coordinated eye and body movements evoked by brainstem stimulation in decerebrated cats. ROBERT F. FAULKNER AND JANE E. HYDE ..... 171

Electrophysiology of olfactory bulb. MAXWELL MARK MOZELL ..... 183

Notice ..... 197

Reviews ..... 198

Manuscripts accepted for publication ..... 202

## NO. 3, MAY 1958


Sprouting as a cause of spasticity. G. P. McCouch, George M. Austin, C. N. Liu, and C. Y. Liu ..... 205

Postsynaptic source of dorsal root reflex. Grayson P. McCouch and George M. Austin ..... 217

Changes in state of consciousness and patterns of eye movements. Howard P. Krieger, Irving H. Wagman, and Morris B. Bender ..... 224

Cortical evoked responses in auditory area and significance of apical dendrites. Curt von Euler and Gian Franco Ricci ..... 231

Electroretinogram of freshwater turtle: quantitative responses to color shift. Alexander Forbes, Helen Wendler Deane, Marjorie Neyland, and Mary Susan Gongaware ..... 247

Effect of veratrine on muscle fibre membrane and on negative after-potential. George B. Frank ..... 263

Subcortical threshold voltages as a function of sine wave frequencies. Marjorie L. Brown and C. E. Brackett, Jr. ..... 279

Patterns of activity in single cortical units following stimulation of the digits in monkeys. Arnold L. Towe and Vahé E. Amassian ..... 292

Notices ..... 312

Reviews ..... 313

Manuscripts accepted for publication ..... 317


## NO. 4, JULY 1958


Crossed inhibition of sacral motoneurones. D. R. Curtis, K. Krnjević, and R. Miledi ..... 319

Strychninization of bulbar ventromedial reticular formation and galvanic skin reflex in thalamic cats. G. H. Wang ..... 327

Synaptic transmission in spinal cord during Wallerian degeneration of dorsal root fibers. Cristián L. Vera and J. V. Luco ..... 334

Evoked central nervous system activity relating to peripheral unmyelinated or 'C' fibers in cat. William F. Collins and Clark T. Randt ..... 345

Effects of discrete brainstem lesions in cats on perception of noxious stimulation. Ronald Melzack, W. A. Stotler, and W. K. Livingston ..... 353

Spontaneous activity of Betz cells in cats with midbrain lesions. A. R. Martin and Charles L. Branch ..... 368

Inhibition of Betz cell activity by thalamic and cortical stimulation. Charles L. Branch and A. R. Martin ..... 380

Effect of striatal and claustral stimulation upon spinal reflex and strychnine activity. J. P. Segundo, E. F. Migliaro, and J. A. Roig ..... 391

Subthalamic hyperkinesia in rhesus monkey. Effects of secondary lesions in red nucleus and brachium conjunctivum. Malcolm B. Carpenter and Geoffrey M. Brittin ..... 400

Reviews ..... 414

Manuscripts accepted for publication ..... 417

## NO. 5, SEPTEMBER 1958


Mechanism of lateral inhibition in eye of *Limulus*. TSUNEO TOMITA ..... 419

Electroclinical features of convulsions induced by stimulation of brain stem. A. KREINDLER, E. ZUCKERMANN, M. STERIADE, AND D. CHIMION ..... 430

Potentials evoked in cat cerebral cortex by diffuse and by punctiform photic stimuli. ROBERT W. DOTY ..... 437

Modulation of sensory discharges by efferent spindle excitation. CARLOS EYZAGUIRRE 465

Representation of cutaneous tactile sensibility in cerebral cortex of *Cebus*. JEAN FRANÇOIS HIRSCH AND WILLIAM S. COXE ..... 481

Thalamocortical relations as revealed by induced slow potential changes. JOHN M. BROOKHART, A. ARDUINI, M. MANCIA, AND G. MORUZZI ..... 499

Notices ..... 526

Manuscripts accepted for publication ..... 527


## NO. 6, NOVEMBER 1958


Action of d-lysergic acid diethylamide on lateral geniculate synapses. P. O. BISHOP, G. FIELD, B. L. HENNESSY, AND J. R. SMITH ..... 529

Analysis of position sense in human shoulder. LEONARD A. COHEN ..... 550

Contributions of tactile, musculo-tendinous and joint mechanisms to position sense in human shoulder. LEONARD A. COHEN ..... 563

Electric responses of auditory neurons in cat to sound stimulation. YASUJI KATSUKI, TADAAKI SUMI, HEIICHI UCHIYAMA, AND TAKESHI WATANABE ..... 569

Mechanism of gamma aminobutyric acid (GABA) action and its relation to synaptic inhibition. STEPHEN W. KUFFLER AND CHARLES EDWARDS ..... 589

Contralateral and ipsilateral cortical responses from somatic afferent nerves. HIROSHI NAKAHAMA ..... 611

Reviews ..... 633

Manuscripts accepted for publication ..... 635

Index ..... 637